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E68: Stochastic Modeling of Annual Rainfall for Crop Production in North Central Nigeria

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Abstract

A stochastic model to study annual rainfall pattern in North Central Nigeria has been presented in this paper. A Hidden Markov Model (HMM) was developed for the study. The study classified amount of rainfall at a time into three states, each state with eight possible observations. The HMM was trained using Baum-Welch algorithm to attained maximum likelihood, after which it was used to make predictions. The Model was implemented in Niger, Benue and Plateau states of North Central Nigeria. Results from locations in Niger and Benue states showed some similarities, as compared to location in Plateau state with different pattern. The similarities may suggest one of the reasons that makes both states the leading producers of food crops in the country. The validity test for the model showed that, the model is reliable and dependable. Therefore, results from this model could serve as a guide to the farmers and the government to plan strategies for high crop production in region. The results could also assist the residents in this region to better understand the dynamics of rainfall which may be helpful for effective planning and viable productions.

Keywords: *Hidden Markov Model, Annual Rainfall, North Central Nigeria, Baum-Welch Algorithm*